

LICENSEE EVENT REPORT (LER)															Form Rev. 2.0							
Facility Name (1)										Docket Number (2)					Page (3)							
Quad Cities Unit One										0   5   0   0   0   2   5   4					1   of   0   4							
Title (4) Reactor Low Water Level Scram Occurred When an Equipment Out-Of-Service (OOS) Disabled the Feed Water Level Control Due to Inadequate Review of Controlled Drawings When Preparing the OOS.																						
Event Date (5)			LER Number (6)				Report Date (7)			Other Facilities Involved (8)												
Month	Day	Year	Year	Sequential Number	Revision Number	Month	Day	Year	Facility Name	Docket Number(s)												
0	9	3	0	1998	1998	0	2	2	0	0	1	0	2	9	1998	0	5	0	0	0		
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)																			
POWER LEVEL (10)			20.402(b)				20.405(c)				X				50.73(a)(2)(iv)				73.71(b)			
			20.405(a)(1)(i)				50.36(c)(1)								50.73(a)(2)(v)				73.71(c)			
			20.405(a)(1)(ii)				50.36(c)(2)								50.73(a)(2)(vii)				Other (Specify in Abstract below and in Text)			
			20.405(a)(1)(iii)				50.73(a)(2)(i)								50.73(a)(2)(viii)(A)							
			20.405(a)(1)(iv)				50.73(a)(2)(ii)								50.73(a)(viii)(B)							
			20.405(a)(1)(v)				50.73(a)(2)(iii)								50.73(a)(2)(x)							
LICENSEE CONTACT FOR THIS LER (12)																						
Name										TELEPHONE NUMBER												
Charles Peterson, Regulatory Affairs Manager, ext. 3609										AREA CODE												
										3   0   9   6   5   4   .   2   2   4   1												
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																						
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	IMPORTANCE TO EPIC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	IMPORTANCE TO EPIC													
SUPPLEMENTAL REPORT EXPECTED (14)																						
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO										Expected Submission Date (15)												
										Month   Day   Year												

ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single-space typewritten lines) (16)

### ABSTRACT:

On 09301998 at 0206, Unit 1 was in Power Operation at approximately 100% power when a low reactor water level scram occurred due to a feed water flow transient during an equipment Out of Service (OOS). Note: An equipment tagout is referred to as an OOS. The OOS had been prepared to repair a drain valve for a Reactor Feed Pump (RFP) flow element with the feed water level control in 3-element control (inputs from reactor level, feed flow, and steam flow.) The Operations personnel responsible for preparing the OOS did not implement adequate provisions to prevent an impact on feed water level control due to their erroneous understanding that the RFP flow element was not an input with the RFP breaker open. When the OOS was performed, a high differential pressure was sensed resulting in a high flow signal which closed down on the feed water regulating valves, resulting in a rapid level decrease to the low level scram. Following placement of feed water level control in single-element, level increased until the RFP's tripped automatically at 0207, approximately one minute after event initiation. Based on initial indications of high feedwater flow and decreasing reactor water level, operators did not trip the RFP's. The cause of the event was inadequate review of drawings during preparation of the OOS, which would have corrected the operator's misunderstanding. Corrective actions include operator training, precautionary labeling, heightened risk assessment for OOS activities, reviewing the OOS process for changes and evaluating disciplinary actions. A review for previous events did not identify any similar events in the last 2 years.

The safety significance of this event was minimal. The plant systems responded with an automatic reactor scram and a trip of the RFP's as expected to place the plant in a safe condition.

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TEXT: Energy Industry Identification System (I.I.S.) codes are identified in the text as (XX)																		

**PLANT AND SYSTEM IDENTIFICATION:**

General Electric - Boiling Water Reactor - 2511 MWt rated core thermal power.

**EVENT IDENTIFICATION:** Reactor Low Water Level Scram Occurred When an Equipment Out-Of-Service (OOS) Disabled the Feed Water Level Control Due to Inadequate Review of Controlled Drawings When Preparing the OOS.

**A. CONDITIONS PRIOR TO EVENT:**

Unit: 1 Event Date: 09301998 Event Time: 0206  
 Reactor Mode: 1 Mode Name: Power Operation Power Level: 100%

This report was initiated by Licensee Event Report 254/98-022

Power Operation (1) - Mode switch in the RUN position with average reactor coolant temperature at any temperature.

**B. DESCRIPTION OF EVENT:**

An equipment tagout is referred to as an OOS. On 09081998, OOS 980010164 was prepared for multiple jobs on the 1A Reactor Feed Pump (RFP), including repairing a sensing line drain valve on the "low" side of the RFP flow element. The OOS Request noted that the repair work would affect both flow transmitters associated with the flow element. Flow Indicating Switch (FIS) 1-3241-11A, provides input to the 1A RFP recirculation valve and Flow Transmitter (FT) 1-0644A, provides input to the Feed Water Level Control (FWLC) (JB). FWLC is normally in 3-element control where feed flow, steam flow, and reactor vessel level all provide inputs to the logic circuitry which positions the Feed Water Regulating Valves. Single element control, which uses only reactor vessel level, is another mode of FWLC. This is not preferred as it is less responsive than 3-element control. The OOS preparer erroneously thought that when the RFP breaker was open, the associated RFP would not provide input to FWLC. Although there are some feed flow inputs affected by opening a RFP breaker, the feed flow input to 3-element control remains active even when the RFP breaker is in pull-to-lock. The OOS preparer conferred with a Senior Reactor Operator (SRO) who agreed that the RFP would not provide input to FWLC with the breaker open.

On 09221998, a SRO approved OOS 980010164. When the SRO approver had reviewed the OOS earlier, he had left a note for the OOS preparer requesting him to add a sequence to isolate the flow instrument in accordance with the standard practice for isolating such instruments. The SRO approver wanted to provide a zero differential pressure condition to protect an indicating flow instrument from an artificially high signal. The downscale input to 3-element control would also prevent the OOS from impacting FWLC, although this was not discussed or fully considered at that time. The OOS preparer performed an in-plant walkdown for this change to the OOS and mistakenly identified FIS 1-3241-11A as the flow transmitter. The OOS preparer revised the OOS to isolate the FIS and discussed the changes to this and several other OOS packages with the approving SRO arriving on afternoon shift. In this conversation, the OOS preparer noted his belief that this OOS would not impact 3-element FWLC as the RFP breaker would be open and the SRO approver agreed based on his recollection of system operation.

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<small>TEXT Energy Industry Identification System (EIS) codes are identified in the text as (XX)</small>																			

When the SRO subsequently approved the OOS, he did not notice that the OOS preparer had isolated the FIS vice the indicating FT, as he had intended.

On 09301998 on shift one, the Unit 1 Supervisor authorized the OOS and a prejob brief was held which included emphasis on following the order of the non-carded steps to isolate FIS 1-3241-11A. The personnel involved with the briefing recognized that the FIS had no relationship to FWLC. The potential risk of the OOS while in 3-element control was not identified during the authorization or prejob brief. A heightened level of awareness briefing was conducted with the Reactor Operators assigned to Unit 1. The risk evaluated during this briefing was a trip of another RFP during the OOS activity.

At 0205, the high and low side instrument root tap isolation valves for the RFP flow element were closed and FIS 1-3241-11A was isolated. A slow leak on a drain cap began to bleed off pressure from the "low" side of FT 1-0644A, which was still providing input to the FWLC. The increasing sensed differential pressure provided an increasing flow input signal to the FWLC. The FWLC output began to drive the Feed Water Regulating valves closed in response to this high flow signal.

At 0206:23, an audible computer alarm was received for high 1A RFP flow. The Reactor Operator responded to the alarm and announced that reactor water level was decreasing rapidly. At 0206:53, a Unit 1 reactor low water level scram occurred at plus 14.63 inches decreasing. At approximately 0207, the Reactor Operator placed FWLC from 3-element to single element control as level continued to decrease rapidly. By 0207:10, reactor water level was at minus 15 inches as the Feed Water Regulating valves were opening based on strictly the reactor level input. By 0207:30, reactor level was at plus 20 inches. As required by procedure, operators were reducing speed on the Reactor Recirculation Pumps, creating a level swell, which further accelerated the reactor level increase. Based on initial indications of high feedwater flow and decreasing reactor water level, operators did not trip the RFP's. At 0207:41, the RFP's automatically tripped at plus 48 inches and level increased to above plus 60 inches before decreasing. A post event review indicated that level did not increase to the point where water would be carried over in the steam lines. Operations stabilized the plant and at 0407 a 4-hour Event Notification phone call was made.

### C. CAUSE OF THE EVENT:

The root cause of the event was inadequate review of drawings during OOS preparation by both the OOS preparer and the SRO approver. Both the OOS preparer and the SRO approver relied on memory and other's opinions to determine that opening the RFP breaker would remove the associated flow element from 3-element control. A review of the logic diagrams would have determined this was not true. The OOS should have placed FWLC in single-element control or isolated the FT. In addition, there was an inadequate review by both OOS preparer and SRO approver to identify that the FIS was being isolated OOS instead of the FT as intended. During the investigation it was recognized that a heightened assessment of risk associated with OOS preparation would be useful in sensitizing personnel to OOS involving critical equipment.

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**D. SAFETY ANALYSIS:**

The safety significance of this event was minimal. The plant systems responded with an automatic reactor scram and trip of the RFP's as expected to place the plant in a safe condition.

**E. CORRECTIVE ACTIONS:**

**Corrective Actions Completed:**

The investigation has been forwarded to the Shift Operations Supervisor to evaluate appropriate disciplinary action for the OOS preparer and the SRO approver.

Placards have been placed adjacent to the RFP FT on both Units to identify that manipulation of the valves while in 3-element control could cause a reactor scram.

The Station is currently identifying all OOS related activities as high risk activities until any needed changes to the OOS process are completed.

Training on the event and F/WLC was conducted for all licensed operators prior to their assuming shift.

**Corrective Actions to be Completed:**

1. Training will revise operator training to address the lessons learned from this event by 02261999. (Training, NTS25418098SCAQ0002201)
2. Operations will review and make changes to the OOS process for heightening the awareness of reliability risks by 01221999. (Operations, NTS25418098SCAQ0002202)

**F. PREVIOUS OCCURRENCES:**

A search of LERs did not identify any other events in the last 2 years caused by inadequate development or review of equipment OOS.

**G. COMPONENT FAILURE DATA:**

Not applicable